

Course Title: Molecular and Cellular Physiology

Course Description:

This course aims to provide students with an understanding of the cellular and molecular mechanisms that underlie physiological processes and their dysfunctions. The course will cover various cellular and molecular physiology topics, including homeostatic control, intercellular communication, synaptic transmission, ionic channels and receptors, sensory perception, neuron-glia interaction, and neuro-hormonal communication. The course will also include student project work, allowing students to apply their knowledge and skills to a research project.

Week 1 (Oct 1): 2h

Wednesday, 4-6 pm: Introduction to the course, homeostatic control, positive and negative feedback Cellular and molecular bases of intercellular communication - synaptic paracrine and hormonal

Week 2 (Oct 6 – Oct 8): 6h

Monday, 4-6 pm: Homeostasis and membrane transport

Wednesday, 4-6 pm: Voltage-gated Ion channels

Week 3 (Oct 13 – Oct 15): 10h

Monday, 4-6 pm: Bioelectrical phenomena of the cell

Wednesday, 4-6 pm: Student project works. Q&A#1

Week 4 (Oct 27 – Oct 29): 14h

Monday, 4-6 pm: Ligand Gated Ion Channels #1

Wednesday, 4-6 pm: Ligand Gated Ion Channels #2 Metabotropic Receptors 2

Week 6 (Nov 3- Nov 5) 18h

Monday, 4-6 pm: Synaptic transmission – molecular determinants of electrical neurotransmission

Wednesday, 4-6 pm: Synaptic transmission – molecular determinants of chemical neurotransmission

Week 6 (Nov 10 – Nov 12): 22h

Monday, 4-6 pm: Student project works. Q&A #2

Wednesday, 4-6 pm: Channelopathies

Week 7 (Nov 17 – Nov 19): 26h

Monday, 4-6 pm: Synaptic Plasticity

Wednesday, 4-6 pm: In vitro brain models

Week 8 (Nov 24 – Nov 26): 30h

Monday, 4-6 pm: Syngap1 Syndrome – rare genetic neurodevelopmental disorder

Wednesday, 4-6 pm: Astrocytes

Week 9 (Dec 1 – Dec 3): 34h

Monday, 4-6 pm: Microglia

Wednesday, 4-6 pm: Blood Brain Barrier

Week 10 (Dec 10): 36h

Wednesday, 4-6 pm: Student project works. Q&A #3

Week 11 (Dec 15 – Dec 17): 40h

Monday, 4-6 pm: Neuroprotective and Neurotoxic Glial Functions

Wednesday, 4-6 pm: Microbiota Gut Brain Interaction

Week 12 (Jan 7): 42h

Wednesday, 4-6 pm: Student project works. Presentations

Week 13 (Jan 12 – Jan 14): 48h

Monday, 4-7 pm: Student project work presentations

Wednesday, 4-7 pm: Student project works. Presentations